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Yasuhiro Hashimoto

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT

PAPER NUMBER

1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/799,043

Applicant(s)

HASHIMOTO ET AL.

Examiner

Jeffrey T. Barton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 10-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 20040311.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-9, drawn to solar cells, classified in class 136, subclass 256.
  - II. Claims 10-15, drawn to a method of manufacturing solar cells, classified in class 438, subclass 95.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the method can be used to make a materially different product, such as a light-emitting diode. In addition, the product can be made a method that involves a sequence of steps other than that claimed in step (i) of claim 10.
3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.
4. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required

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because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Douglas Mueller on 01 October 2007 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-9. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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11. Claims 1-9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Negami et al. Supporting evidence is provided by Sheng et al.

Regarding claim 1, Negami et al disclose a solar cell (Figure 2) comprising first (12) and second (15) electrode layers as claimed, a p-type semiconductor layer (13) disposed between the first and second electrode layers, and a layer (14) disposed between the p-type semiconductor layer and second electrode layer, wherein layer 14 comprises Zn, O, and at least one of Be, Mg, Ca, Sr, and Ba. (Column 5, lines 3-51; note column 5, lines 46-51 specifically regarding layer 14) Selection of two of the alkaline earth elements, including magnesium and any among calcium, strontium, and barium meets the limitations of instant claim 1. Within the options present within "an oxide expressed by the general formula  $Zn_{1-x}A_xO$ , wherein A is at least one selected from Be, Mg, Ca, Sr, and Ba" disclosed by Negami et al, 14 out of 31 possible permutations (i.e. any single listed metal, any pair of listed metals, any three listed metals, etc.) meet the instant limitation requiring magnesium and at least one selected from Ca, Sr, Ba, Al, In, and Ga. This is believed to be a sufficient basis for considering the claims anticipated by Negami et al.

Regarding claim 2, Negami et al list Ca, Sr, and Ba as constituents.

Regarding claim 3, Negami et al disclose that element A is present at levels as low as 0.1 at % (Column 5, lines 50-51), which will lead to Ca, Sr, or Ba levels overlapping the claimed range.

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Regarding claim 4, the film 14 disclosed at Column 5, lines 46-51 of Negami et al have 0 atomic percent Al, In, and Ga.

Regarding claim 5, Negami et al disclose the subscript X ranging from 0-1, which overlaps the claimed range.

Regarding claim 6, Sheng et al disclose  $Zn_{1-x}Mg_xO$  film resistivities that are more than 10 orders of magnitude below that required by the claim. (Table 1) Films taught by Negami et al that include further minor amounts of Ca, Sr, or Ba would have resistivities as claimed. Note also MPEP §2112, which states in part that "[t]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977) There is no difference between the structure taught by Negami et al and that instantly claimed. Therefore, the claimed property is considered to be present in the prior art structure.

Regarding claim 7, Negami et al disclose the p-type semiconductor layer 13 comprising copper, indium, gallium, and either selenium or sulfur. (Column 5, lines 17-25)

Regarding claim 8, Negami et al disclose an n-type layer 13a lying between the p-type layer 13 and oxide 14, wherein the n-type layer comprises copper, indium, and

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selenium. (Column 5, lines 30-34) Since layer 13a is deposited adjacent Zn-containing layer 14, there will be a finite amount of diffusion of zinc into this layer 13a, meeting the limitations to the claim. This is particularly the case since oxide layers 14 and 15 are conventionally deposited at elevated temperatures that increase the rate of diffusion.

Regarding claim 9, Negami et al disclose the first electrode layer 12 being made of molybdenum (Column 5, lines 15-16), and the second electrode 15 being a transparent conductor. (Column 5, lines 64-67)

Since Negami et al teach all limitations of the instant claims, the reference is deemed to be anticipatory.

Note *In re Schaumann*, 197 USPQ 5, concerning the question of obviousness of claims to a species that is present within a small genus disclosed by the prior art. It is the Examiner's position that if it is held that the disclosure of Negami et al is too broad to anticipate instant claim 1, the claim is still rendered obvious by the reference, due to the suggestion that more than one of elements Be, Mg, Ca, Sr, and Ba be included in zinc oxide film 14 as disclosed at Column 5, lines 46-51.

In addition, specific to claim 6, the claimed conductivity would obviously have been present once the product of Negami et al is provided.

In addition, specific to claim 8, the claimed n-type layer comprising Zn, at least one element selected from Cu, In, and Ga, and at least one element selected from Se and S would obviously have been present once the product of Negami et al is provided.



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Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 U.S.C. §103 in addition to the rejection made above under 35 U.S.C. §102.

**Conclusion**

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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JTB  
10 October 2007